MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2022/2023

EEN1026 –ELECTRONICS II

(RE)

14 JULY 2023
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 4 pages excluding the cover page with 4 Questions only.

2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given .

3. Please write all your answers in the Answer Booklet provided.

Question 1

a) With the aid of a diagram, briefly describe how an N-channel JFET is constructed and operated. [3 + 5 marks]

b) The source-follower configuration in Fig. Q1b has I_{DSS} = 16mA, V_{GSQ}= -2.86V, I_{DQ} = 4.56mA, V_P= -4V and r_d = 50kΩ. Given R_G = 1.2MΩ and R_S = 2kΩ.

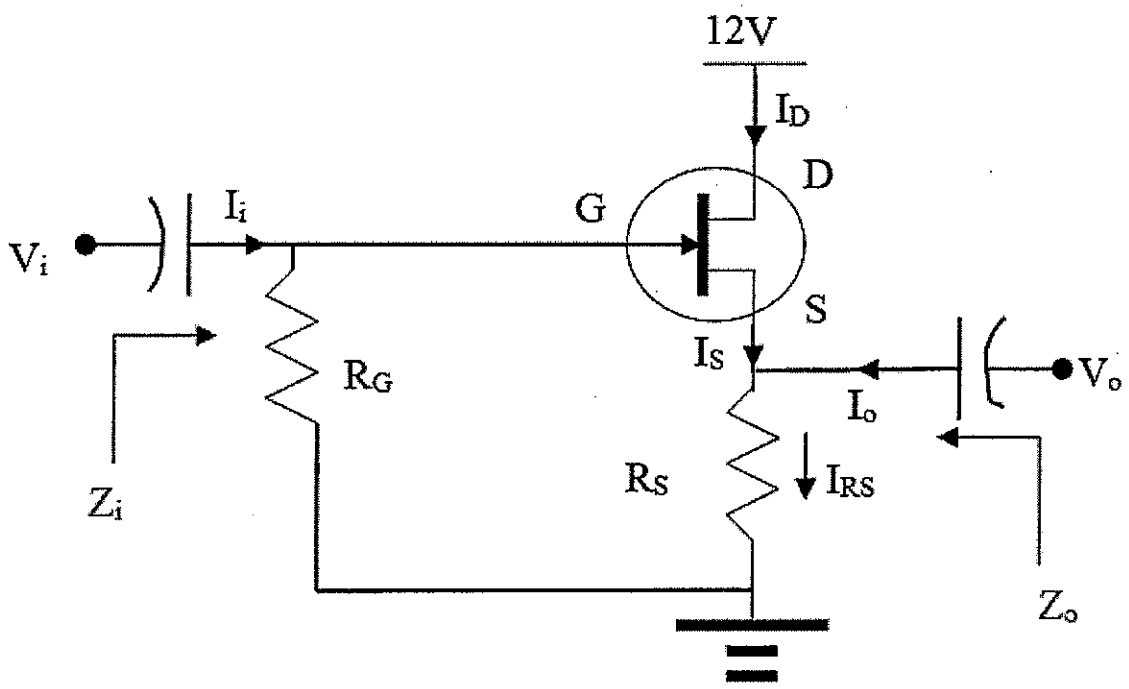

Fig. Q1b

i. Sketch the small signal model ac equivalent circuit. [5 marks]
ii. Determine the transconductance, g_m. [2 marks]
iii. Determine the input impedance, Z_i. [2 marks]
iv. Calculate the output impedance, Z_o. [3 marks]
v. Calculate the voltage gain, A_V. [2 marks]
vi. Calculate the voltage gain, if R_S is removed/open circuited. [3 marks]

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Question 2

a) Determine the cutoff frequency f_l for circuit shown in Fig. Q2a. [2 marks]

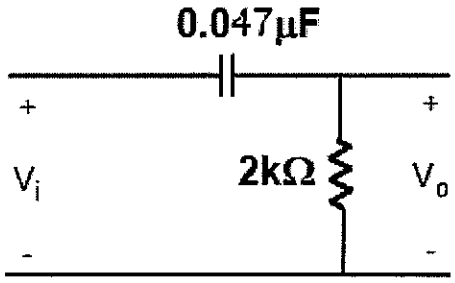

Fig. Q2a

b) Using the result obtained from part (a), determine the $|V_o/V_i|_{dB}$ at:

(i) 100 Hz [2 marks]
(ii) 1 kHz [2 marks]
(iii) 2 kHz [2 marks]
(iv) 5 kHz [2 marks]
(v) 10 kHz [2 marks]

c) An amplifier is being tested with a square wave signal. The input and output signals are shown in Fig. Q2b below.

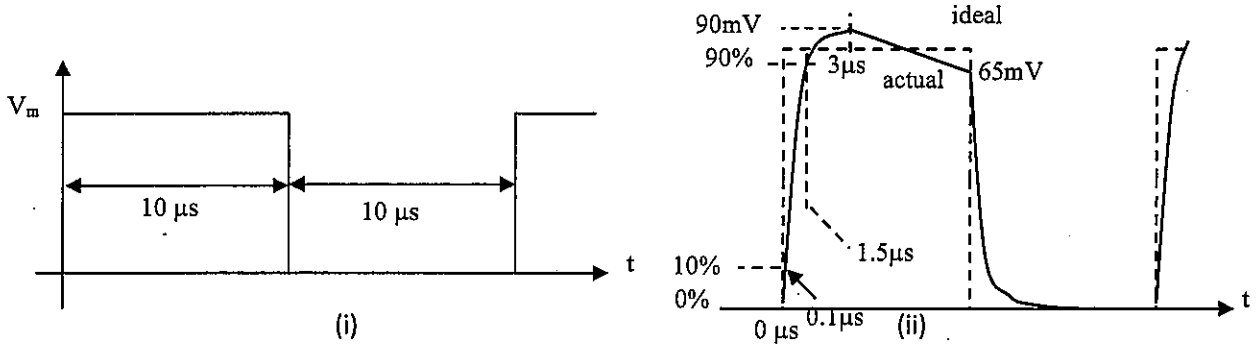

Figure Q2b: (i) Input and (ii) output Signals.

(i) Explain the purpose of testing the amplifier using a square wave input. [4 marks]
(ii) Calculate the percentage of tilt. [3 marks]
(iii) Calculate the Lower Cutoff Frequency. [3 marks]
(iv) Calculate the Upper Cutoff Frequency. [3 marks]

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Question 3

a) What is the purpose of knowing the AC load line for an amplifier and what is the relationship of it with the amplifier compliance? [2 + 2 marks]

b) (i) Discuss THREE (3) characteristics of a Class A power amplifier. [3 marks]

(ii) Discuss THREE (3) characteristics of a Class B power amplifier. [3 marks]

(iii) List down THREE (3) advantages of class B power amplifier as compared with class A power amplifier's operation. [3 marks]

c) For the Class A power amplifier given in Fig. Q3c below:

(i) Calculate the maximum load power. [8 marks]

(ii) Calculate the DC total power. [2 marks]

(iii) Calculate the maximum efficiency. [2 marks]

Assume β of the BJT is arbitrarily large.

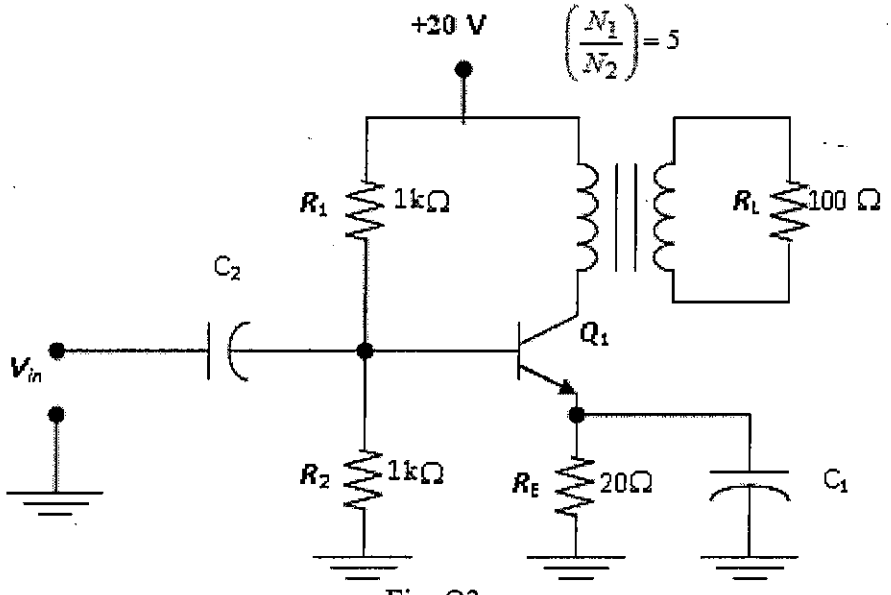

Fig. Q3c

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Question 4

a) (i) Determine the upper trigger point (***UTP***) and lower trigger point (***LTP***) for the *Schmitt Trigger* circuit shown in Fig. Q4a. [6 marks]

(ii) Calculate the hysteresis for the circuit. [2 marks]

(iii) Sketch the output voltage waveform with reference to a sinusoidal input signal having V_{pp} = 20V. Label all the important values. [5 marks]

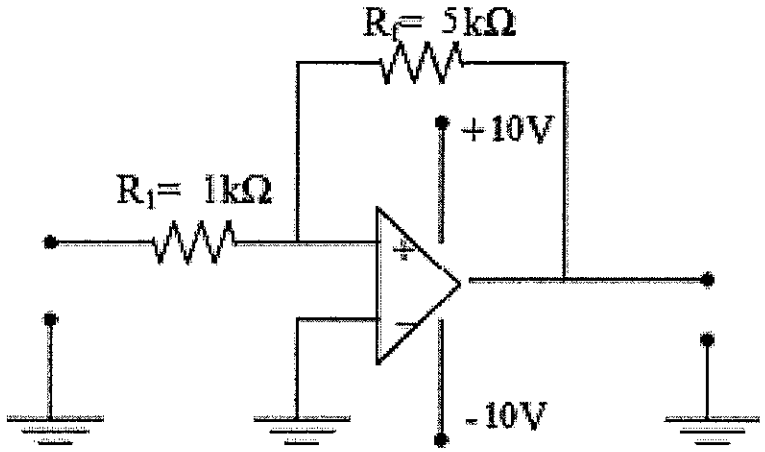

Fig. Q4a

b) (i) Design an astable multivibrator for operating frequency $f_o = 20kH$ with capacitor of 0.01 μF and the pulse width of the waveform to be 30 μs. [10 marks]

(ii) Calculate the duty cycle of the waveform. [2 marks]

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